

Claims

ART 34 AMDT

What is claimed is:

1. A plasma treatment method comprising the step of subjecting a portion of a fuel line for an internal combustion engine to an electric field, wherein
 - a. the fuel line contains a liquid fuel having gas bubbles therein, and
 - b. the electric field generates plasma within the bubbles,with the fuel line subsequently providing the liquid fuel to a combustion chamber of the internal combustion engine.
2. The plasma treatment method of claim 1 wherein the interior of the fuel line has obstacles formed therein within the path of fuel flow, whereby the length of the path of fuel flow is made greater than the corresponding length of the fuel line.
3. The plasma treatment method of claim 1 wherein the solid surface area within the interior of the fuel line is greater than the solid surface area of the exterior of the fuel line.
4. The plasma treatment method of claim 1 wherein the fuel line contains beads therein.
5. The plasma treatment method of claim 4 wherein the beads are formed of catalytic materials.
6. The plasma treatment method of claim 1 wherein the gas bubbles contain the liquid fuel in vaporized form.
7. The plasma treatment method of claim 1 wherein the gas bubbles contain exhaust gas emitted by the internal combustion engine.

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ART 34 AMDT

8. The plasma treatment method of claim 1 further comprising the step of increasing the temperature of the liquid fuel to a degree sufficient to cause the gas bubbles to form in the liquid fuel.
- 5 9. The plasma treatment method of claim 1 further comprising the step of reducing the pressure of the liquid fuel to a degree sufficient to cause the gas bubbles to form in the liquid fuel.
- 10 10. The plasma treatment method of claim 1 further comprising the step of ultrasonically exciting the liquid fuel to a degree sufficient to cause the gas bubbles to form in the liquid fuel.

REPLACED BY
ART 34 AMDT

22. A plasma treatment method comprising the steps of:
- a. passing a liquid fuel having gas bubbles therein through an electric field which generates plasma within the gas bubbles, and
 - b. subsequently providing the liquid fuel to a combustion chamber of an internal combustion engine.
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23. The plasma treatment method of claim 22 wherein the electric field is generated by electrodes which are stimulated at a voltage and frequency sufficient to generate plasma within the gas bubbles.
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24. The plasma treatment method of claim 23 wherein the liquid fuel is situated between the spaced electrodes.
25. The plasma treatment method of claim 23 wherein the liquid fuel is situated adjacent the spaced electrodes.
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26. The plasma treatment method of claim 22 wherein:
- a. the electric field is provided about a fuel line containing the liquid fuel, and
 - b. the fuel line provides the liquid fuel to the combustion chamber of the internal combustion engine.
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27. The plasma treatment method of claim 22 wherein the gas bubbles contain the liquid fuel in vaporized form.
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28. The plasma treatment method of claim 22 further comprising the step of increasing the temperature of the liquid fuel to a degree sufficient to cause the gas bubbles to form in the liquid fuel.

REPLACED BY
ART 34 AMDT

29. The plasma treatment method of claim 22 further comprising the step of reducing the pressure of the liquid fuel to a degree sufficient to cause the gas bubbles to form in the liquid fuel.
- 5 30. The plasma treatment method of claim 22 further comprising the step of ultrasonically exciting the liquid fuel to a degree sufficient to cause the gas bubbles to form in the liquid fuel.